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there being so vast a deal of room, that 40000 People may shelter themselves in it. And he that would attempt to seek them out in this vast Wilderness of Walks and Pillars, without an expert Guide, would not only be in hazard of losing his way, but of being knock't in the head at the Corner of every Pillar, where people lurking in the dark with their Carabins and Fowling pieces, would have fair opportunity to shoot them by the light of their own Torches.

In this vast *Grotto* 'tis remarkable, that there is but little Rubbish: which shews both the goodness of the Stone, and the carefulness of the Workmen. And in divers places there are little Pools of Water, perhaps made on purpose for Beasts to drink, and to serve for other uses in time of need: For in no place almost are there any Droppings to be seen; nor are the Walks at all wet under-foot; only it seems, that Rain gets in by the *Air-shafts*, which, for saving of labour, and perhaps too, to make these Pools, are let down from such places commonly, as are the Pools thereabout; and so the Rain, that falls on the higher grounds, does easily find the way thither.

An Account of some Books.

- I. *TRACTS* written by the Honourable Robert Boyle, of a Discovery of the Admirable *RAREFACTION* of the *AIR* (even without Heat:) *New Observations about the DURATION of the SPRING of the AIR: New Experiments touching the CONDENSATION of the Air by meer COLD; and its COMPRESSSION without Mechanical Engins: And the admirably DIFFERING EXTENSION of the same Quantity of Air rarified and compressed.* London, for H. Herringman, 1670. in 4°.

THE main drift of these Excellent *Tracts* is, to invite the Curious to observe the stupendious Mutability of the *Air*, as to Rarity and Density, whereby the same Quantity of Air, being sometimes compress'd, sometimes dilated, may change its Dimensions to a degree, that seems almost to transcend the power of Nature and Art, and might be look't upon as incredible, if it were abruptly and nakedly proposed, or by a person of only *common* skill in these matters.

It will then appear by the Experiments and Calculation, made by our Noble Author, that, according to the least Estimate of any recited in them, the Extension of the same Quantity of Air, is as 1. to 2744. or thereabouts: And if, instead of the moderateſt, there be taken the greateſt Expansion of the Air; being as about 13000 to 1, when the *uncompreſt* Air was highly rarify'd, that number being multiplyed by 40, becauſe of the great Compreſſion of the Air, effected by Cold (as appears in the Third of theſe Tracts,) will amount to 520000, for the number of times, by which the Air at one time exceeds the ſame portion of Air at another time: Which is an Expansion ſo great, that it will eaſily keep the Reader from thinking the Title of this *Diſcourſe*, where the Rarefaction of the Air is call'd *Admirable*, immodeſt.

It will alſo appear by theſe Tracts, that the Air may by the Intervention of Art and Inſtruments be much more expanded, than it has yet been found to be by the bare application of External Heat, though it were that of an Intenſe Fire it ſelf.

The Natural Philoſopher will doubtleſs, upon the reading of this ſtrange Expansion of the Air, be excited to conſider, when he ſhall look on one of our Author's well exhausted Receivers, How ſmall a proportion the Common Aereal particles, which are very ſparingly diſpers'd there, bear to the whole Cavity of the Veſſel, which, before it was exhausted, was thought to be replenish'd with Air alone. Certainly both the *Carteſians* and *Epicureans* will find themſelves highly concern'd in this matter. The *former* will endeavor thereby to eſtabliſh the neceſſity of their *Materia ſubtilis*, to maintain the *Plenitude* of the World, and the Circle they attribute to Moving Bodies. The *latter* will think, they have cauſe here to triumph, as believing to have met with a more illuſtrious Inſtance, than ever, of their *Vacuum Coacervatum* within the World; ſince here is an impenetrable Veſſel, out of which 'tis manifeſt, that an almoſt incredible proportion of Aerial ſubſtance hath been made to iſſue; whereas 'tis no ways manifeſt to any of our ſenſes, that any other Body hath got in to ſucceed in its room.

II. *ELEMENTA GEOMETRIÆ PLANÆ.* Authore Ægidio Francisco de Gottignies Bruxellensi, Soc. Jesu in Collegio Romano Matheseos Professore, Romæ 1669. in 12 .

THis Author, in a *Monitum* to the Students of Geometry, intimates, that he hath read Mathematicks more than 7 years at *Rome*; that it hath been his custome to advise his Scholars, *first* to read over the Definitions, the Titles of Propositions, and to exercise themselves in the Construction of Problems, without being solicitous of the truth of the Propositions or Constructions, until they become familiar; and after they are somewhat conversant with the Geometrick Assertions and Phrases, then to doubt of their truth as much as they please, and study their Demonstration. The same, in the Proeme thinking it convenient to begin with Quantity, treats of it abstractly, as void of such affections and modes as are congruent thereto.

1. In his first Chapter he giveth Definitions, Postulates, and Axiomes.

2. In the second, because one quantity in relation to another is said to have a *Ratio* or *Proportion*, he treats of *Ratio's*, and delivers the doctrine of the fifth Book of *Euclid*; to which are annexed 7 questions about *Geometrical Proportions* with their Solutions, clearing up the debates, that through the mistakes of some late Authors have risen about *Ratio's*.

3. He treats of Angles, and of the affections of Angles in plain Right-lined Figures. And at the end of this Chapter he states the question, Whether an Angle be a *Quantity* shewing, that *Clavius* affirms *all Angles* to be quantities; *Peletarius* denies the *Angle of Contact* to be a quantity; *Tacquet* condemns both, denying *any Angle* to be a quantity, to whom our Author assents, and on this Hypothesis removeth 5 Paradoxes, that are natural to the other assertion. And whereas a late Writer alledgeth, that it may be pleaded to be the opinion of the Antients, he saith, that among the Learned moderns, it is now refuted, herein siding with *Gregory of St. Vincent*, *Aynscomb*, *Tacquet*, and *Dr. Wallis*.

4. He treats of Rectangles,

5. Of

5. Of Triangles and Right-lined Figures.

6. Of Circles, where he delivers the Doctrine of the third Book of *Euclid*; and, imitating *Archimedes*, enlargeth this Chapter with other property's, which he had first shewn to be congruent to Right-lined Figures.

7: He treats of Problemes, by which a Preparation is made to pass from Speculation to Use and Practice.

The Author having thus altered *Euclid's* order, giveth an *Index*, to shew where the Propositions of the 1, 2, 3, 5 and 6th. Book of *Euclid* are to be found in these Elements.

He hath passed over all the Propositions of the 4th. Book of *Euclid*, as superfluous in his method: In that Book, 'tis known, that *Euclid* teacheth, How to Inscribe or Circumscribe *some*, but not *any* Regular Figures about a Circle: Of this he treats at the end of the 7th. Chapter. This Doctrine is either necessary for Practice, as in *Fortification*; or in order to the Construction of the *Canon* of *Sines*. He intends to treat of *Trigonometry* and *Practical Geometry* elsewhere, saying in his Dedication;

Euclidem ex novo adornare studui, brevi tamen scriptione concinnatum, ut esset opportunior. Ex quo tanquam ex fundamento pendet reliqua mearum doctrina tractationum, quas prælo paratas me habere probè nosti. As to his method of Demonstration, he saith, Demonstrationes vix alias pono, quàm affirmativas, ut discentibus constet, ea quæ proponuntur non tantùm vera esse, sed etiam cur vera sint: in Euclide non pauca per negativas demonstrationes probantur, vel in his probandis negativè tantùm probata assumuntur; & An rectè omnia, nonnulli controvertunt.

III. SYNOPSIS GEOMETRICA; cum Tribus Opusculis, De LINEA SINUUM & CYCLOIDE; De MAXIMIS & MINIMIS, Centuria; Et SYNOPSIS GEOMETRIÆ PLANÆ, Auth. Honor. Fabry S. Jesu. Lugduni Galliarum 1669 in 12°.

THis Author in this *Geometrical Synopsis* hath endeavour'd, as M. *Gottignies*, (just now taken notice of,) promiseth to do in his *New Euclid*, to render *Geometry* clearer and easier by delivering such Demonstrations, as prove the thing in hand by *direct* and *intrinsic* Principles, not such as are *indirect*, and leading *ad absurdum* & *impossibile*, whereby 'tis only concluded, that the thing cannot be false, but not shewn, why it is and must be true. In reference to which, he considers, that, whereas *Geo-*

metry consists in demonstrating the proprieties of *Quantity*, there is no such propriety, but it belongs to it by some genuine and intrinsic principle, easily to be found out by the *Analysis* or *Genesis* of *Quantity*. By which way he Judgeth, that *Geometry* may be exceedingly contracted, forasmuch as very many things, separately demonstrated in the received way, may then be evinced joyntly by one plain and easy Demonstration; considering that, where the same propriety belongs to various quantities and figures from the same intrinsic Principle, whether they be Plain, or Solid, or Right-lined, or Curve, or Mixt; nothing hinders, but *that* propriety may be Demonstrated of them all by one onely Demonstration.

And hence this Author is inclinable to lay aside those many Divisions of *Geometry*, as are made by Authors, *viz.* into *Trigonometry*, *Planometry* and *Stereometry*; and peculiar and prelix Treatises of *Conical Sections*; of the *Sphere* and *Cylinder*; of *Lines* of divers kinds; of *Plain* and *Spherical Triangles*; of a *Solid Angle*; of *Proportions* and *Proportionalities*, &c: esteeming, that a more convenient Division will serve his Design; whence he compriseth this whole *Synopsis* in two parts.

The *First* treats of the *Elements* for Beginners, and contains 6 parts: In the first whereof are deliver'd the Definitions and Explications of Terms, the Axioms, and *Postulata*. In the second, are explain'd the *Genesis* and *Analysis* of Figures, and their different *Classes*. In the third, are demonstrated the Elements of *Lines* and *Angles*. In the fourth, is treated of *Ratio's* and *Proportions*. In the fifth, are considered the *Products* of the *Segments* of a *Line*, multiplyed into one another. In the sixth, are handled the remaining Elements.

In the *Other*, he proceeds to the Demonstration of higher and abstruser things; and this part he divideth into several *Classes*, each of which contains all its *homogeneous* figures, Right-lined or Curve, Solid or not Solid; there being so many several *Ranks*, as there are different ways of their Generation. These *Classes* are here distributed into two sorts, the *one* contains those Figures, whose Generating quantity is drawn either into the whole Altitude, or into its Rational or Commensurable Segment, for the *Æquation* of the Figure; the *other* is of those, whose Generating quantity can only be drawn into an Irrational

nal Line, for *Æquation*. But he adds, that it often falls out, that one and the same Figure belongs to several *Classes*, in regard that it may be resolved into divers Elements, or have more than one *Genitrix*, and therefore, according to the variety of the *Genitrix*, may be diversly generated. And this, he esteems, doth very much commend his Method, in regard that there is the same *Æquation* of the same Figure, whether it be demonstrated in this or that *Classis* by this Intrinsic Principle.

Mean time this Author denyeth not, that this kind of *direct* Method was before him deliver'd and publish't by *Bonaventura Cavalerius*, but adds, that it was done with such difficulties and obscurities, as deterred young Students from it; which in this *Synopsis* are said to be avoided, or removed.

As to the Three *Opuscula*, adjoyned to the *Synopsis*, the Author affirms of the *First*, that it was publish't *Eleven years* since, but uncorrectedly; now Re-printed more carefully, and with a design, to give a Specimen of his new Method in that abstruse Argument; adding withal, that, for ought he knows, he is the first that hath written of this Subject; only he had seen some few things concerning the *Cycloid* in *Torricellius*, in that *Appendix*, which he subjoyn'd to the Problem of the *Dimension* of the *Parabola*, where he very well demonstrates, that the Space contained by the *Cycloid* and *Basis*, is Triplicate to the Generating Circle. But our Author affirms to have here added many new Demonstrations, alledging, that *Torricellius* in the said *Appendix* hath demonstrated nothing else, but that one thing just now recited. And though the same in his *First Book De Motu Gravium* doth *propose* many excellent things of the *Cycloid*, yet our Author observeth, that he hath *demonstrated* none of those.

Concerning the *second Opuscle*, viz. the Century of his Propositions *De Maximis & Minimis*, he affirms, to have written them, for his divertisement, many years ago. And the *third*, which is a *Short piece of Trigonometry*, he saith to have hastily Compos'd at the solicitation of an Ingenious Friend, to serve Mathematical Beginners.

IV. *DIALOGI PHYSISICI, quorum Primus de Lumine; Secundus & Tertius De VI PERCUSSIONIS & MOTU; Quartus De HUMORIS ELEVATIONE per CANALICULUM;*

Quintus & Sextus *De Variis Selectis*. Auth Honor. Fabry, S. Jesu, Lugduni Galliarum, 1669. in 8°.

THis Learn'd Jesuit in those *Dialogues* writeth against *Grimaldi*, *Alphonfus Borelli*, and *Montanari*, who in divers things differ from what he hath written: Against the *first*, concerning *Light*, and that great controverted point, *Whether it be a Body?* And whether *Reflection*, and *Refraction* prove it to be such? &c. Against the *second* he writeth, about *Motion* and *Percussion*, where many things are discuss'd; as, Whether motion be *produced*, or *traded*? Whether the *impetus* of the least Body may move the greatest Body? Whether the Force of *Percussion* be a certain action of Compression in the Impellent Body? What are the Laws of two *Projected* Bodies; equal, or unequal; of equal, or unequal velocity? Whether the Times of the Vibrations of different *Pendulums* are in a sub-duplicate proportion of their Lengths? Whether a Body impelled, being reflected by a Springy and Compressed Body, restoring it self, be moved and carried back with that *Impetus* only, which it received from the same? Whether a Body *Horizontally* projected will at the same time come to the ground, as if it had of it self fallen down *Perpendicularly*? Why Bricks are broken by the percussions of an Hammer, though they remain whole under the weight of a vast and bulky Body? And why an Hatchet cleaveth Wood, whereas a very heavy weight laid on an Hatchet fixed in Wood, doth not? What is the Principle of the Motion of Restitution? And many more. Against the *third* he writeth, about the *Ascent of Liquors in slender Tubes*; to wit, whether that Rising proceeds from the Gravitation of the Air, or from its Compression only, prescinded from its weight? Whether Liquors do rise equally high, in longer and shorter Tubes, but of equal bore? &c.

The *Two last* Dialogues contain *Miscellanies*: As, of the *Impetus* innate in Bodies, assigned them by Nature to attain their respective Ends; of the Gravitation of the Air and its pressure downwards, to make Vapors ascend; of the Variety of Motion in Heavier and Lighter Balls moved on Longer or Shorter, thicker or slenderer, strings; of new Mechanical Powers; of an Hypothesis for solving the *Phænomena* of the *Tydes* by the Pressure of the Atmosphere, importing, that the Tydes
do

do vary according to the inequality, or the various Circles of the Air's pressure, and the several Tracts of those Circles, in respect of their Scite and Extent; so that if all the Circles of that pressure of the Air were free, that is, if the water did cover the whole Surface of the Earth, it would rise much higher in the Tydes; (See pag. 406, 407:) Besides, of a Question, Whether in a Ship moved, all the motions of the people carried in it will be made after the same manner, as if made in a Ship not moved; Of the 7 Rules of Motion deliver'd by *M. Hugen*s, with some considerations thereon, p. 411; Of the great Compression of the Air, in reference to what *Mr. Boyle* hath publish't on that Subject, p. 436; Of the Controversy, Whether the Mercury in the *Torricell*. Experiment be sustain'd by the external Air, or by a Tense matter within; Of the cause of the *Glass-drops* shiver'd in small pieces by breaking off the tail of them, p. 467; Of *Electricity*, p. 475, &c. But whether our Author have the better of those, against whom he writes, I shall not take upon me to Judge, but leave it to the Reader to think as he shall see cause.

V. *ANTONII MOLINETTI, Phil. & Med. Veneti, &c. DISSERTATIONES ANATOMICÆ & PATHOLOGICÆ de Sensibus & eorum Organis. Patavii, 1669. in 4°.*

IN this Learned Treatise of the *Senses*, the Author begins from the consideration of the Touch, discoursing of the genuine Organ thereof, which he maketh to be the soft substance of the Nerve only.

Next, he treats of the *Sight* and its Organ; where he largely discusseth the old Controversy of the manner how Vision is made, whether by the Reception of the Species or visible rays of the Object, or by the Emission of the Spirits of the Eye; maintaining the former, and refusing the latter. Then he proceedeth; 1. To speak of the nature of *Light* and *Colours*, esteeming the distinction of Colours into *Real* and *Apparent* to be puerile. 2. To treat of the Three Refractions of the Luminous rays made in the Eye, by the several humors thereof. 3. To assign the different apertures of the Pupill according to the distance of the object, and the degrees of its illumination; as also the respective offices of the Chrysellin, Vitreous, and Aqueous humors; and the reason of their position, and configuration,

guration, &c. 4. To give the History of the *Tunicles* and *Muscles* of the Eye, asserting the *Retina* to be the formal organ of Vision; and Seven *Muscles* to perform all the motions therein; and observing the curious structure and *apparatus* in all. 5. To discourse of the various Distempers of Eyes, and to observe, that there is scarce any particle of that organ, not subject to some peculiar distemper; which he very learnedly and accurately specifies and enlarges upon.

Thirdly, he treats of *Hearing* and its Organ; having premised, that the difference of the several Senses consists only in the different *apparatus*, by which all the sensible Objects are received in one and the same formal organ, of the same kind; as also, what Analogy there is in the structure of the Eye and Ear; the *Cornea* of the one answering the *Membran* of the other; the Water within the *Cornea*, to the Air within the *Tympanum*; the Ciliar ligaments of the Eye, relaxing or streightning the *Pupill*, to the *Stapes* of the Ear, capable to be easily moved inward, and a little outward. Now of this Sense of Hearing he observeth, 1. The Air-reflecting organ (answerable to the Refractive organ in the Eye) and remarketh the admirableness of its fabrick; as also how exactly every vibration of the Air, made upon the *Drum* by the outward Air, is by the Labyrinth of the Ear distinguish'd from one another. 2. The manner, how *Hearing* is performed; where occur divers un-common Observations about the *Malleus*, *Incus*, and *Stapes*; and the three *Holes* in the *Drum*; as also of the passage, by which the cavity of the Drum hath a consent with the Palat, &c. 3. The many distempers of this Organ, very accurately described.

Fourthly, concerning the Sense of *Smelling*, he 1. Taketh notice, that *Vesalius* was the first, that rightly observed the *Olfactory* Nerves. 2. He observeth the Analogy of this Sense to those of Seeing and Hearing. 3. Giveth the reason, why Doggs, Horses, and some other Animals excel the rest in the strength of Smelling. 3. Affirms, that moisture falls into the Nose, not by the Holes of the *Os Ethmoides*, but by those that are in the inward corners of the Eyes. 4. The *Diseases* of this Sense; where the Author taketh occasion to commend the Art of *Taliacotius* in restoring lost Noses, and to confirm the truth of that Practice, performed by his own Father,

Fifthly,

Fifthly, touching the *Tast*, he 1. Maketh the *Tongue* the Organ of it, as it is made up of such a kind of Porous Flesh, cover'd with such a coat, and very plentifully enterwoven with such nerves; furnish't with a fine *Saliva*, which being mixed with the meat and drink, sinks it into the nerves through the pores of the Coat, and so gives different kinds of *Tast*. 2. Compareth this Sense with all the former, by observing the Analogy betwixt them. 3. Assigneth the difference between *Tast* and simple *Touch*. 4. Enumerateth the Affections of the *Tongue*, and insists especially upon the *Convulsion* and *Palsy*, which it is subject to.

Having dispatched his Dissertation about the *Five Senses*, he proceeds to the consideration of the *Brain*, whereof he 1. Explains the admirable structure, connexion and dependency of its parts. 2. Shews the difference of the *Animals* Spirits from the *Vital*; which he esteems to be only this, That the Animal Spirits are Vital Spirits highly rectified, refined and perfected in and by the Brain, for Sensation. 3. Lays open the origine of the *Nerves*, proceeding from that part of the Brain, call'd *Pons Cerebri*, which he makes to be nothing else but a *Congeries* or Heap of innumerable Filaments, divaricated out of the Solider substance of the Brain; whence all the *Nerves* (many of those threds being joyned together) take their rise; which in their issue out of the Bones, either those of the Skull or the *Vertebra's*, are inveſted by both Membrans, which contain them as well, as they do the Brain it self. 4. Declares, that in the said *Pons Cerebri*, from whence all the *Nerves* proceed, is transacted the *Common Sensation*; confidently affirming, that whatever motions are made in the Organs of Sense by the Spirits that are in the *Nerves*, they must needs be conveyed into the Principle of the *Nerves* (which, in his judgment, is the *Pons*;) and that performed in a moment of time, by reason of the continuity of the Spirits from the Sensory's to the said common Source. 5. Distinguisheth the Operations of the *Common Sense* from those of the *Phancy*, and *Memory*; and wicah teacheth, how the Rational Soul differenceth the Apprehensions of things from those made by Brutes. 6. Determines not, whether, for the *Memory*, the *vestigia* of things are impressed in the Brain; or whether the substance of the Brain be so framed, that according to the different agitation of the Spirits it may be contracted or dilated; or else, whether the Pores or minute Pas-

sages

fages between the medullar Filaments be open'd, or shut, and that more or less; or lastly, whether it be, that the Spirits are variously disposed, whilst the *Medulla* of the Brain remains in the same state? 7. Discourseth of *Sleep* and *Waking*; where he very curiously observeth, *first*, How far there is in Sleep a Cessation of Sense and Motion; and how *Night-walkings* and *Respiration*, (two very strong Motions) are performed in Sleep: *Secondly*, What is the immediate cause of that Cessation, *viz.* a scanty and alter'd influx of the Spirits into the Organs of outward Sense. 8. Ascribeth the exact knowledge of the *Medulla Spinalis* to that excellent *English* Physitian and Anatomist Dr. *Willis*. 9. Explains the order in which the several Combinations of the *Nerves* do proceed, out of the Medullar Mass of the Brain, into and through the whole Body. 10. Concludeth the whole with an Explication of the *Affections* and *Diseases* of the Brain; and shews, *first*, How the various *Head-aches* are caused by the various qualities of the parts that compose the Blood, which being either *bilious*, *sulphureous*, *salin*, *aqueous*, or *terrestrial*, do accordingly cause lacerating, pricking, vellicating, or heavy pains: *Secondly*, How the *Dropsy* of the Brain is caused by the copious serosities gather'd between the Membrans of it. *Thirdly*, How *Ulcers*, *Obstructions*, and *Inflammations* are produced. *Fourthly*, How those many *Perturbations* and *Symptoms* are occasioned in the Brain, as *Sadnefs*, *Fear*, *Sleepiness*, *Madness*, *Forgetfulness*; *Epilepsy's*, *Apoplexy's*, among which two last he finds this difference, that an *Epilepsy* is not necessarily preceeded by any Obstruction; an irritation and an offensive afflux to the Sensible parts, being able to produce it alone; whereas an *Apoplexy* never comes without an Obstruction of the Spirits. *Fifthly*, How *Palsy's* are caused, *viz.* by an influx of impure Spirits from the Origine of the Nerves into the beginnings of the same. *Sixthly*, How *overmuch Watching* is occasioned, namely by over-hot Spirits; as an *Un-natural Sleep* is produced by thick, torpid and cold vapors, intermingled with the Spirits, &c.

Errata.

In Numb. 65. p. 2014. l. 17. del. first, and read, were started. Besides, the Reader is desired, not to be offended at the oversight of the Printer, who in this same Tract of N 65, when he should have numbred page 2107, did print 2007; whereby some confusion would arise in the Index that is to follow, if therein the Publisher did not intend to prevent it in some measure by quoting as well the Number of these Tracts as the page. In this Numb. 67. p. 2040. l. 17. del. Farewell.

L O N D O N,

Printed for John Martyn, Printer to the Royal Society.